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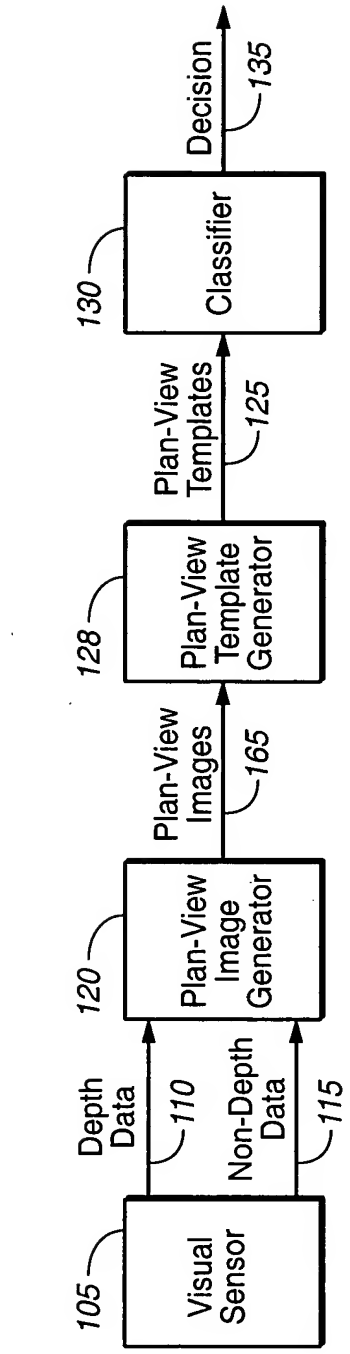

FIG._1A

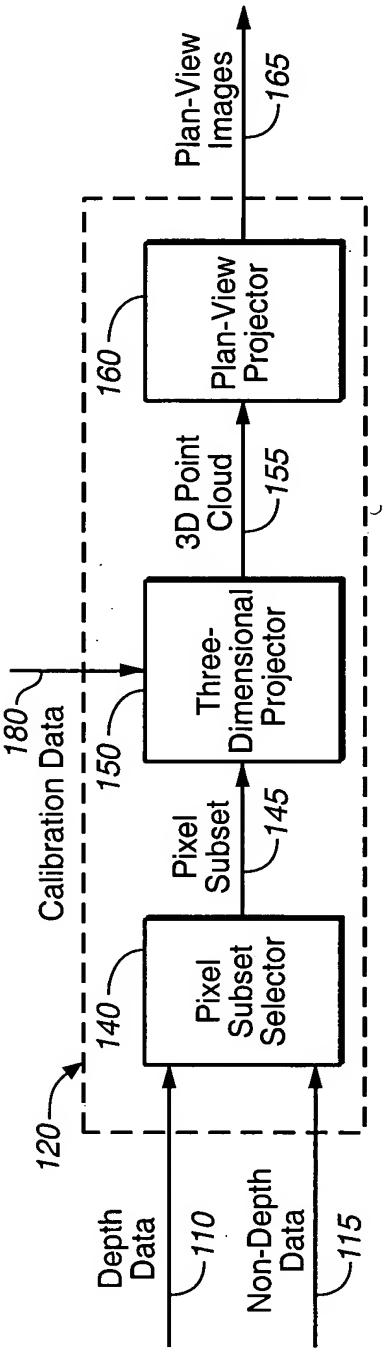

FIG._1B

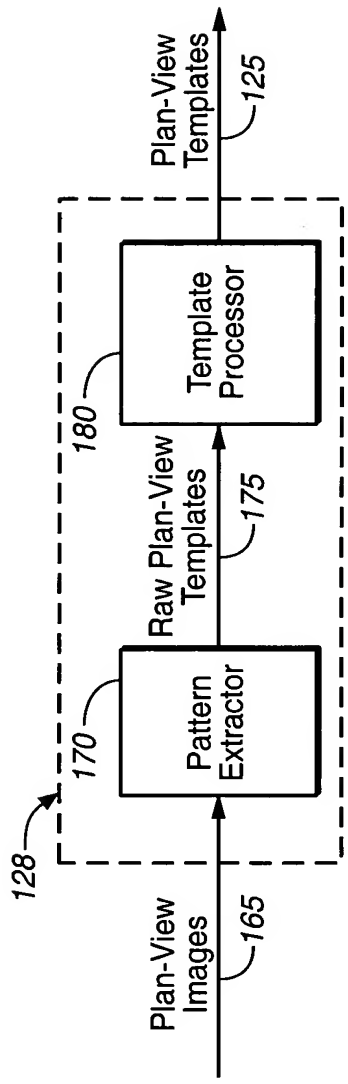

FIG._1C

200

FIG._2A

210

FIG._2B

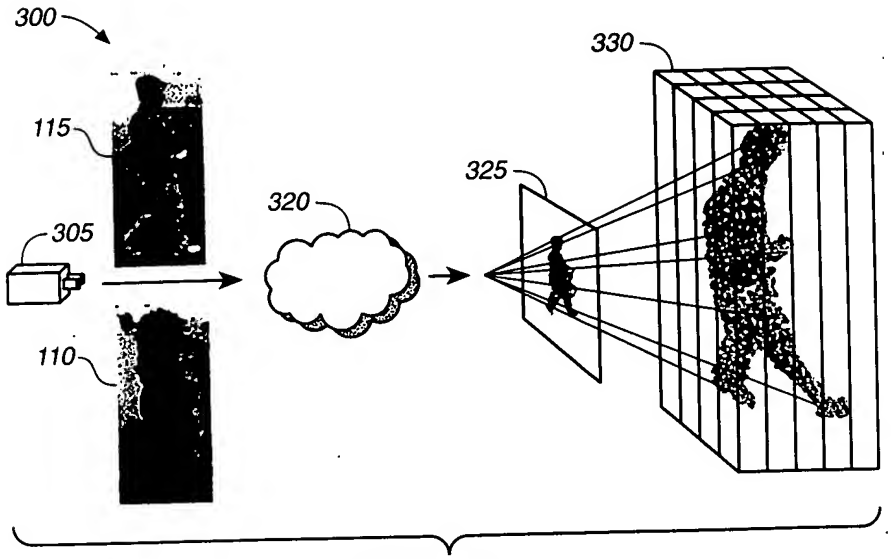
300
115
305
110
320
325
330

FIG._3

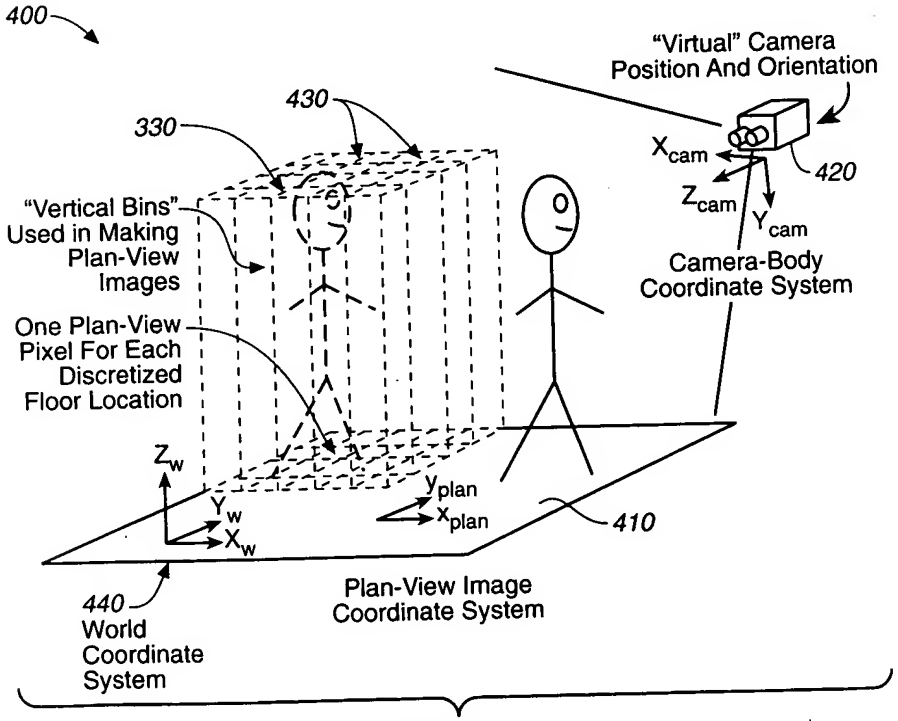
400
"Virtual" Camera
Position And Orientation
430
330
X_{cam}
420
Z_{cam}
Y_{cam}
"Vertical Bins"
Used in Making
Plan-View
Images
Camera-Body
Coordinate System
One Plan-View
Pixel For Each
Discretized
Floor Location
Z_w
Y_w
X_w
y_{plan}
x_{plan}
410
440
World
Coordinate
System
Plan-View Image
Coordinate System

FIG._4

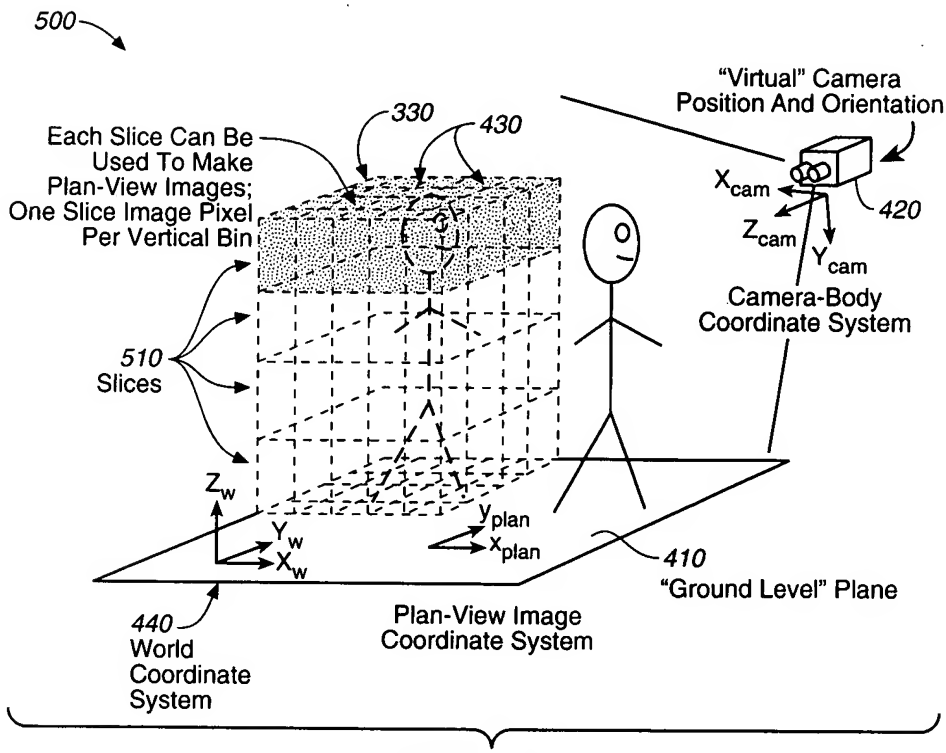

FIG._5

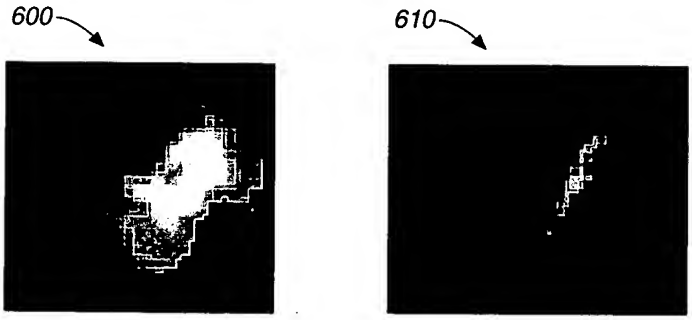

FIG._6A FIG._6B

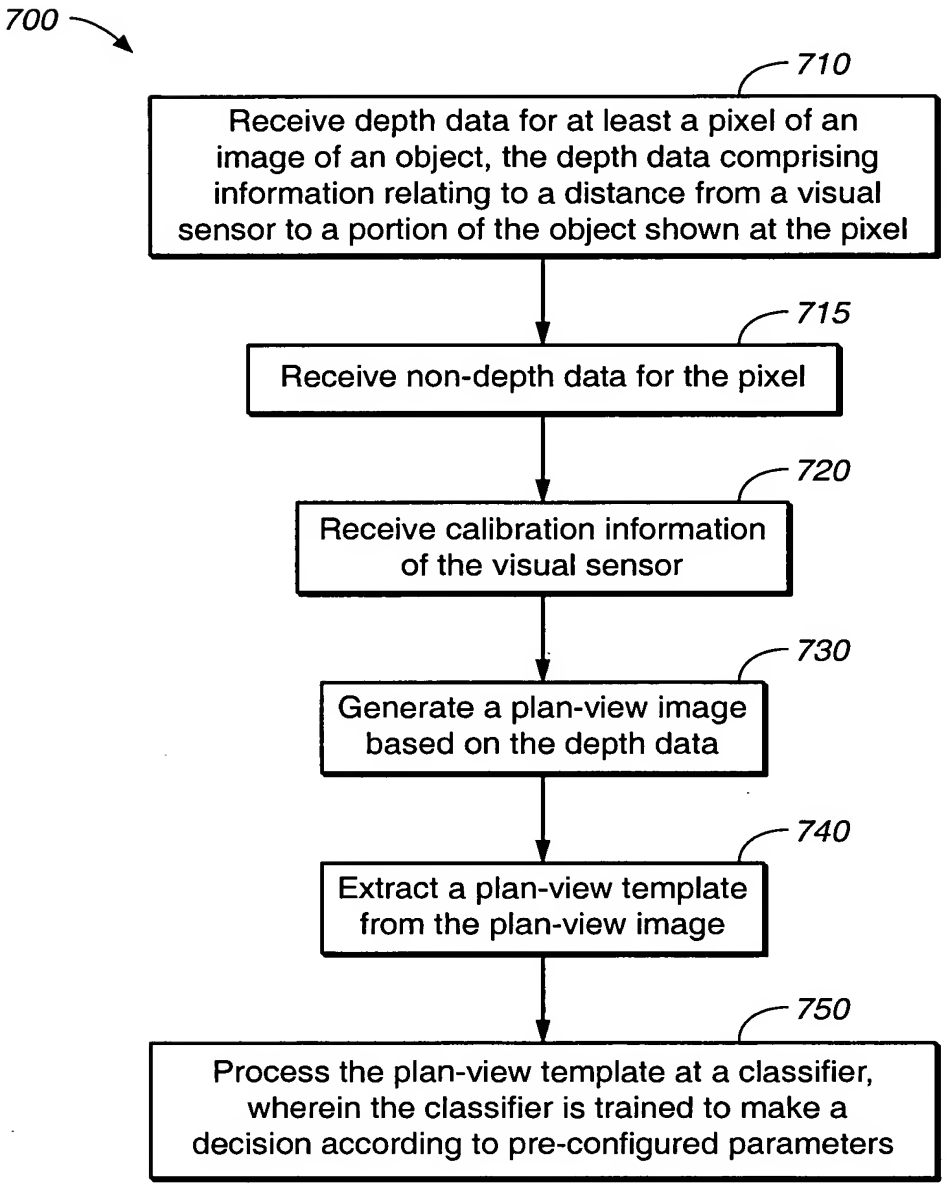
700
710
Receive depth data for at least a pixel of an image of an object, the depth data comprising information relating to a distance from a visual sensor to a portion of the object shown at the pixel
715
Receive non-depth data for the pixel
720
Receive calibration information of the visual sensor
730
Generate a plan-view image based on the depth data
740
Extract a plan-view template from the plan-view image
750
Process the plan-view template at a classifier, wherein the classifier is trained to make a decision according to pre-configured parameters

FIG._7

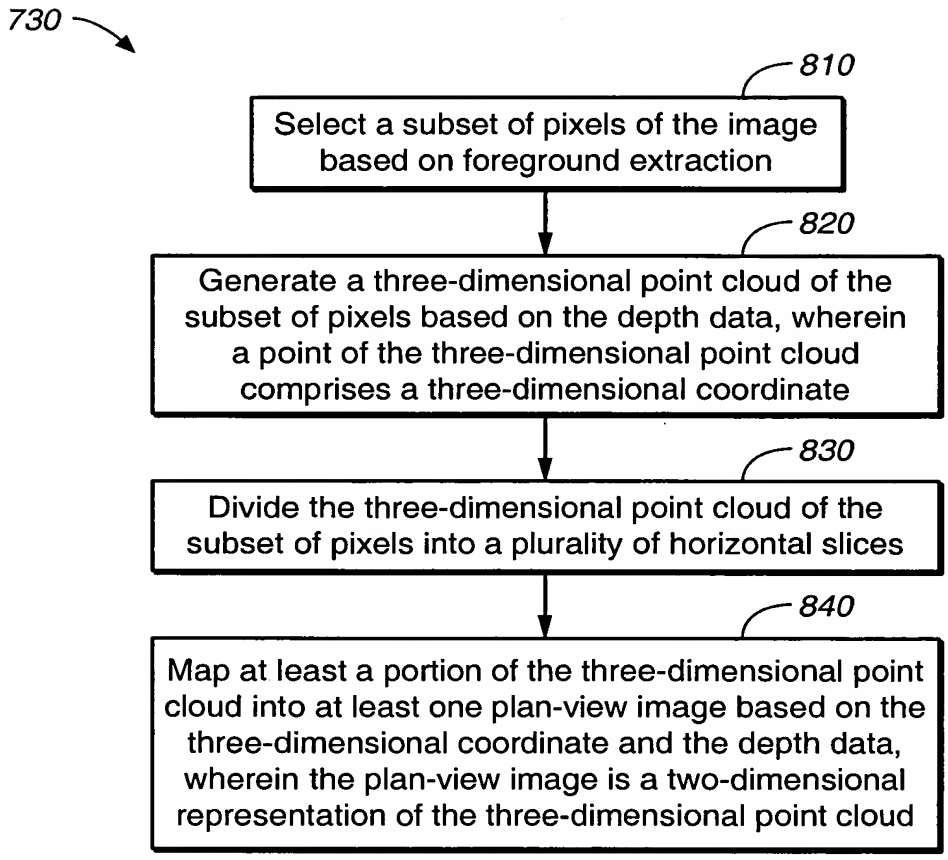
730
810
Select a subset of pixels of the image based on foreground extraction
820
Generate a three-dimensional point cloud of the subset of pixels based on the depth data, wherein a point of the three-dimensional point cloud comprises a three-dimensional coordinate
830
Divide the three-dimensional point cloud of the subset of pixels into a plurality of horizontal slices
840
Map at least a portion of the three-dimensional point cloud into at least one plan-view image based on the three-dimensional coordinate and the depth data, wherein the plan-view image is a two-dimensional representation of the three-dimensional point cloud

FIG._8

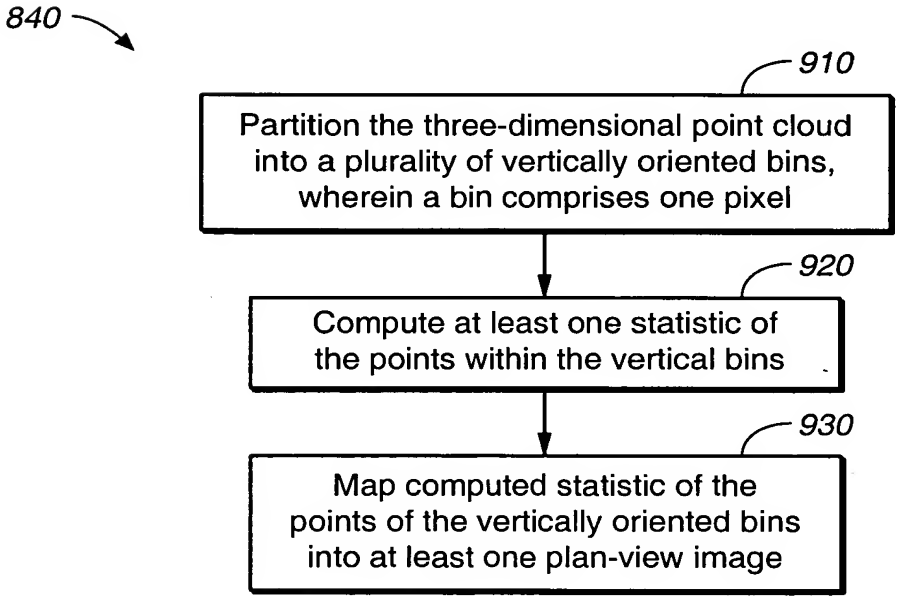
840
910
Partition the three-dimensional point cloud into a plurality of vertically oriented bins, wherein a bin comprises one pixel
920
Compute at least one statistic of the points within the vertical bins
930
Map computed statistic of the points of the vertically oriented bins into at least one plan-view image

FIG._9